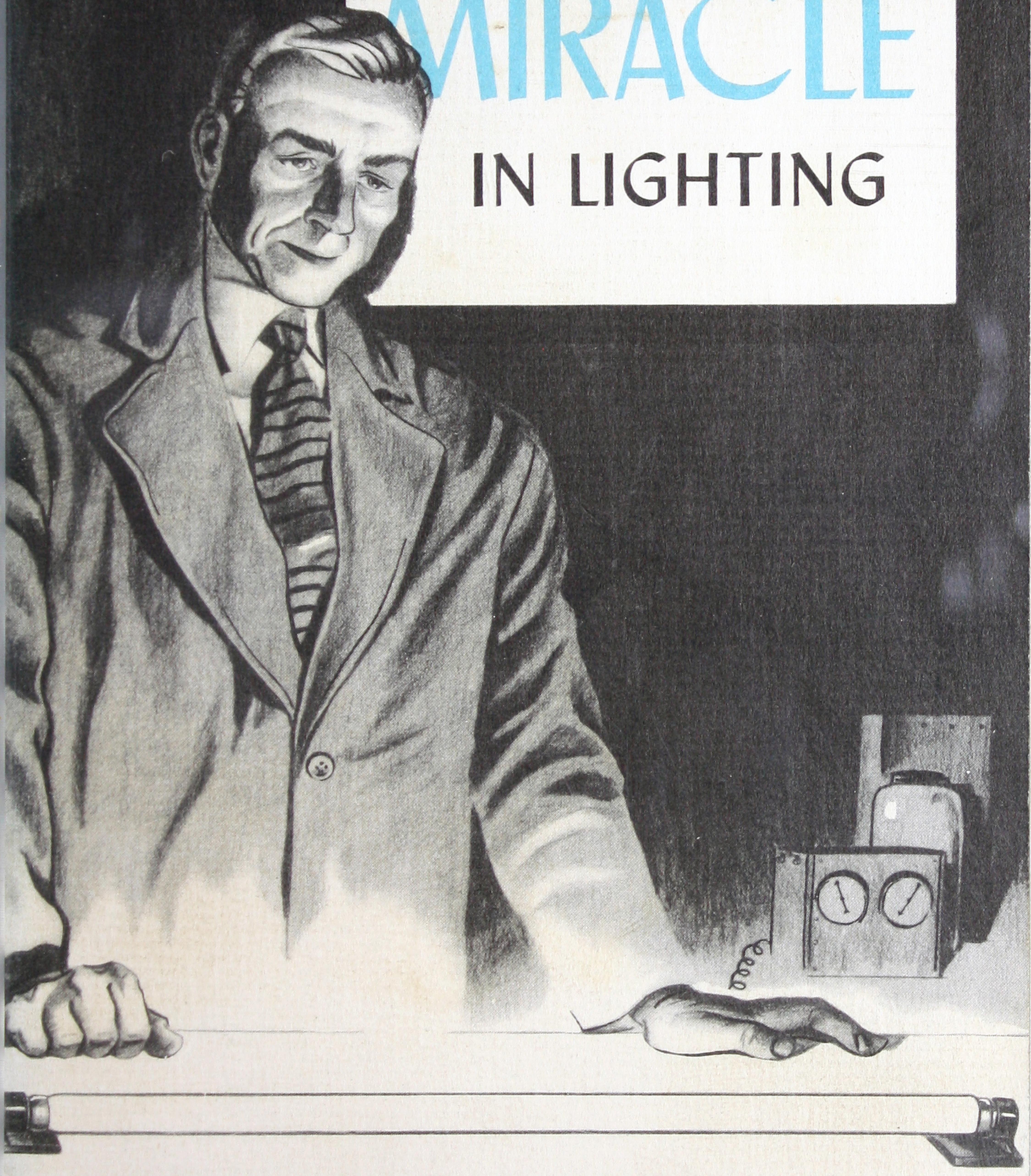
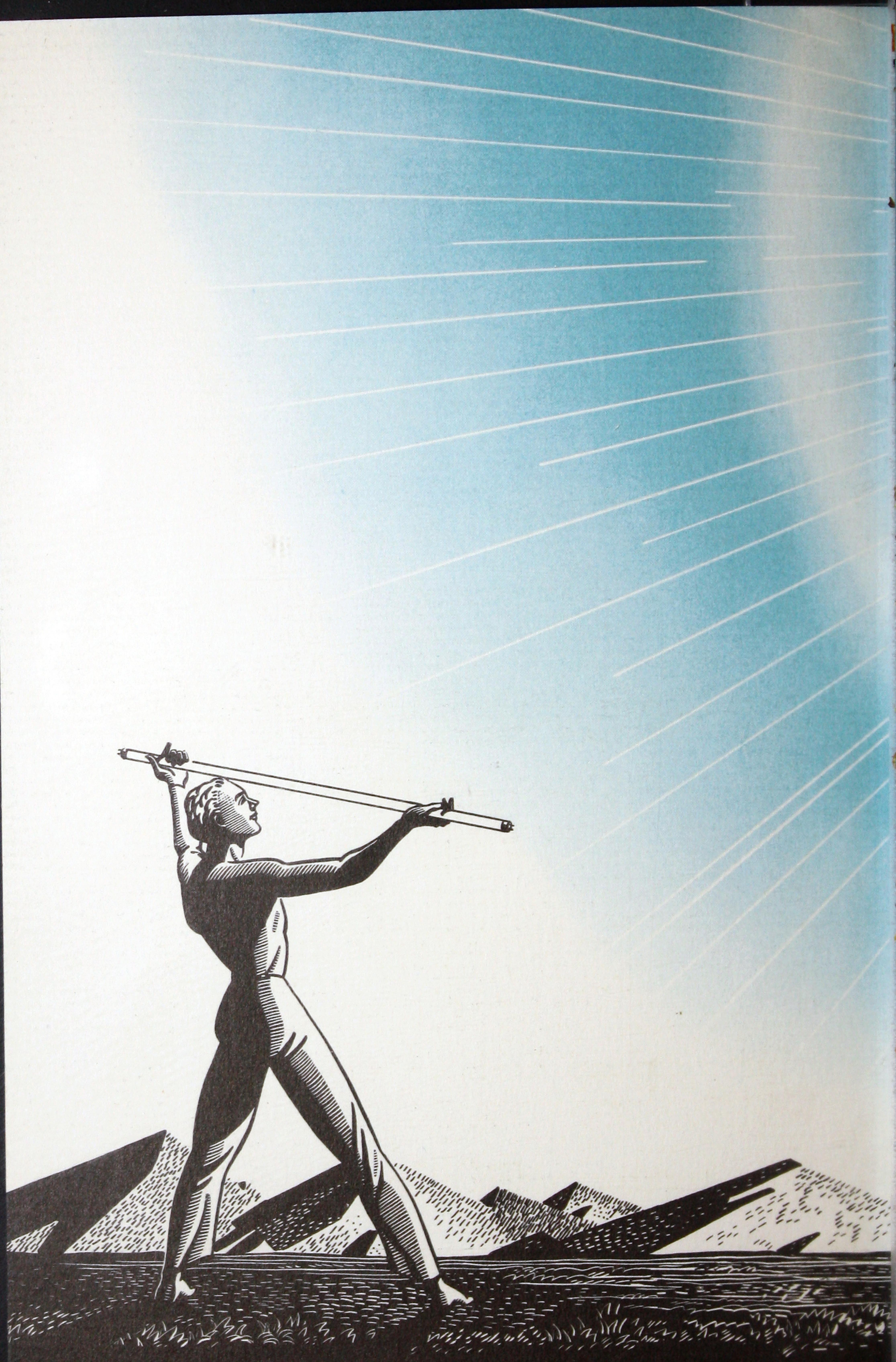
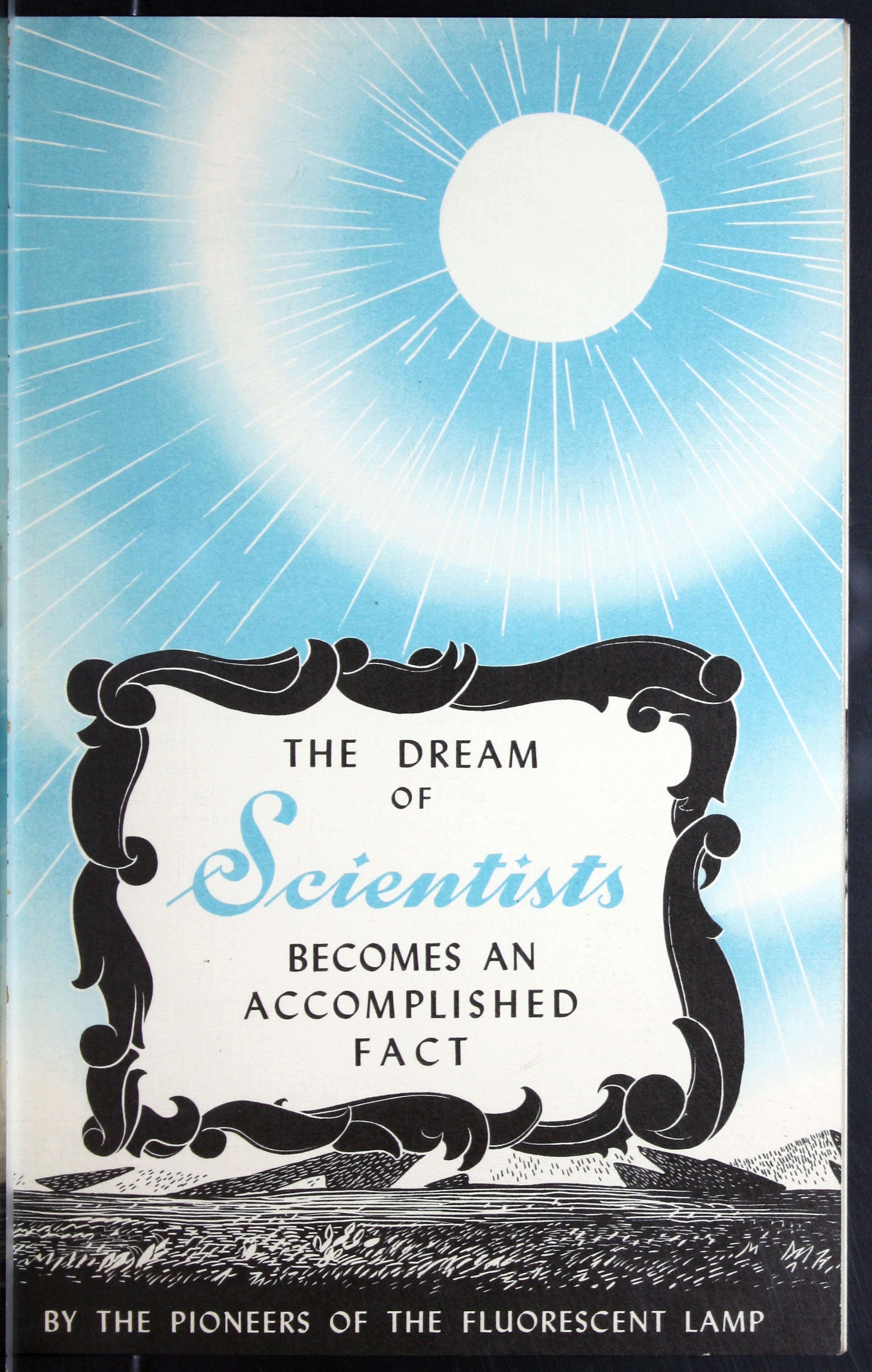


J. D. Lee.
YOU HAVE LIVED
TO SEE A
MIRACLE
IN LIGHTING



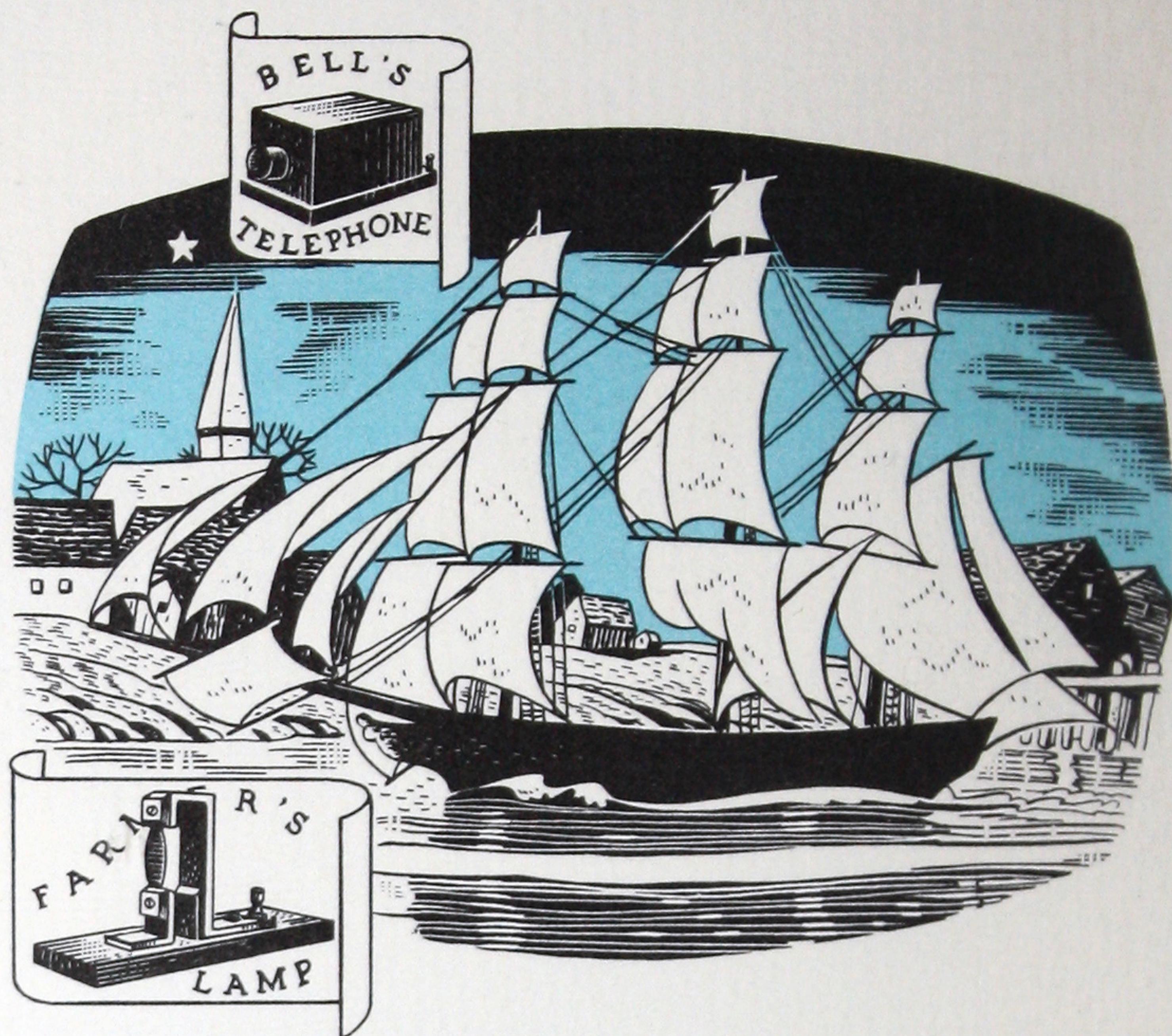


THE STORY OF FLUORESCENT LIGHTING—



THE DREAM
OF
Scientists
BECOMES AN
ACCOMPLISHED
FACT

BY THE PIONEERS OF THE FLUORESCENT LAMP



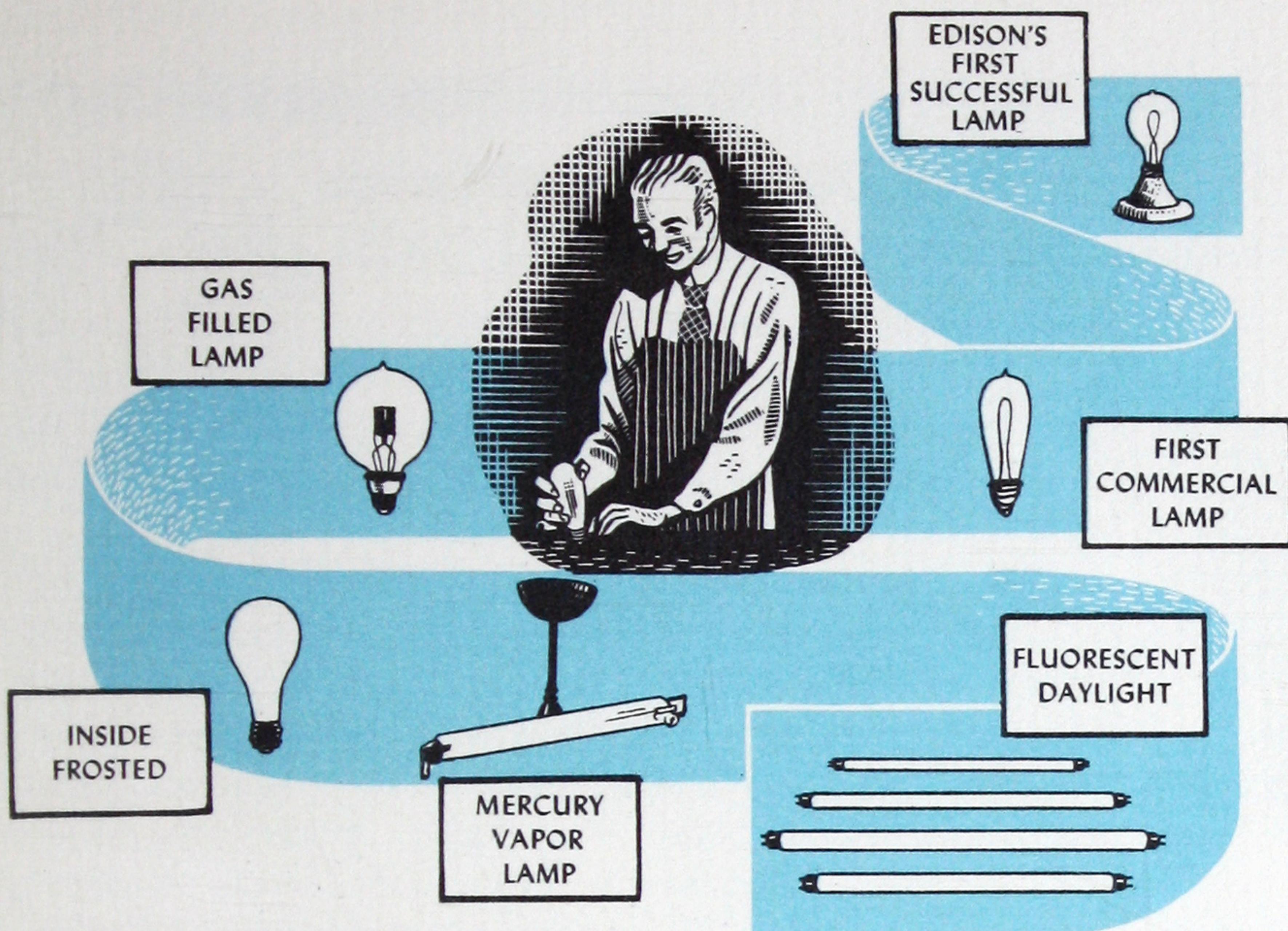
SALEM—SCENE OF AMERICAN PROGRESS IN COMMERCE AND SCIENCE . . .

Salem, Massachusetts, has played an important part in the development of America, from the days when proud sailing ships cleared this port in world commerce, to the present day of modern industry. But Salem has more than a background of history to make it famous throughout the world. Salem has been the birthplace of many of the world's greatest devices for the comfort and service of mankind.

Here Alexander Graham Bell developed the telephone, and the first telephone communication line was run between Salem and Boston.

Here Moses Gerrish Farmer, with a wet cell battery and a crude lamp, made one step in releasing civilization from smoky lamps and flickering tapers — gave the world a spark that led to Edison's first incandescent bulb, and thence to modern lighting as we know it today.

AND NOW - FLUORESCENT LAMPS COME
FROM THE SALEM LABORATORIES OF
HYGRADE SYLVANIA CORPORATION



PRACTICAL FLUORESCENT LIGHTING WAS LONG DREAMED OF BY SCIENTISTS

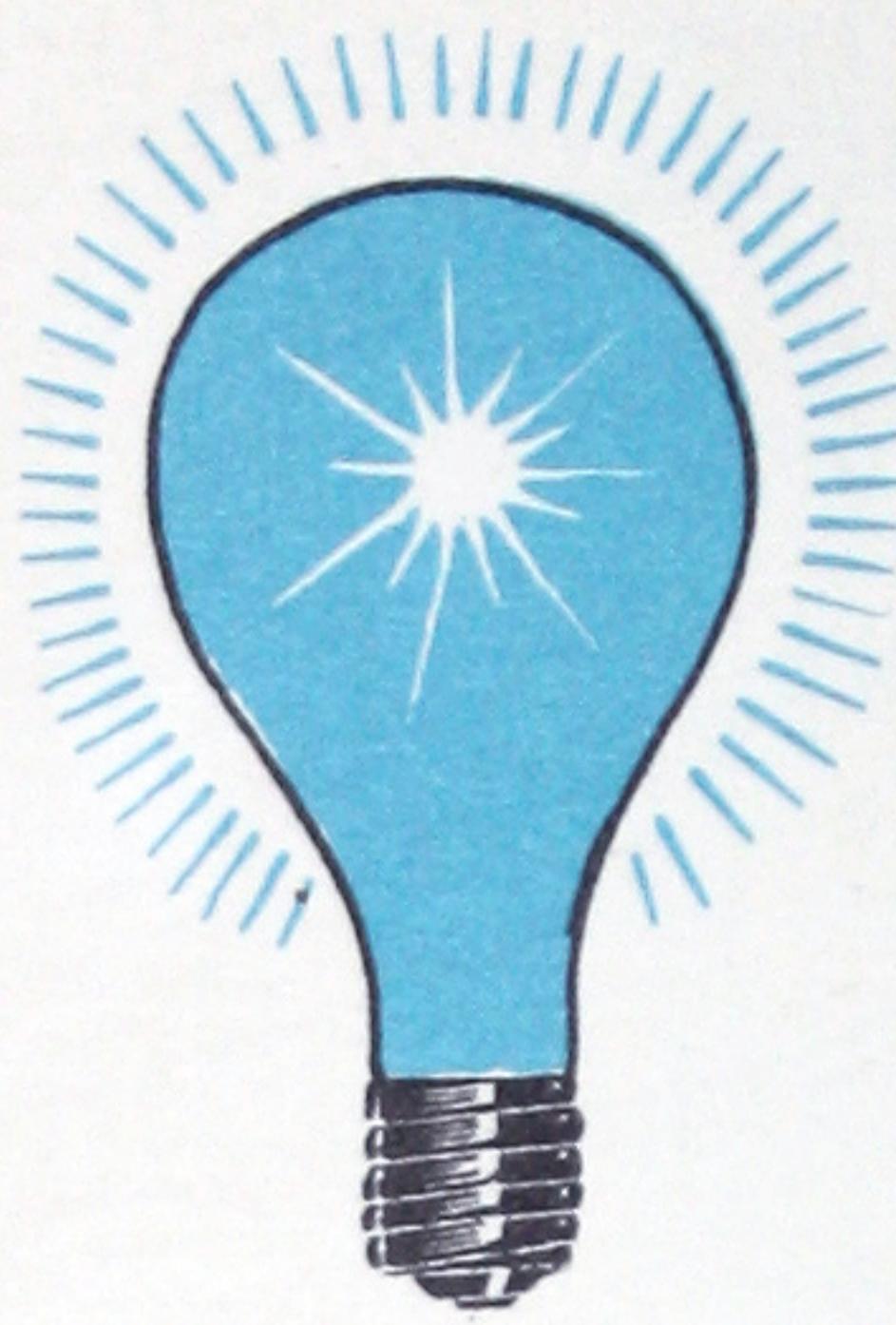
To dispel darkness, it has been the natural objective from the very beginning to approximate *natural daylight*, by artificial means. Daylight was the fixed and ever challenging standard toward which lighting engineers and inventors have been working for over six decades.

Despite the tremendous advances and improvements in lighting, there still remained — until recently — the un-reached goal of reproducing daylight electrically and *at low cost*. Scientists believed that this would be achieved by fluorescence — a more efficient source of light than incandescence. The *need* for such light no one could, or would, deny.

The elements that would eventually come into play in the production of fluorescent light were known long before a practical solution was reached. Scientists knew that if ultraviolet radiant energy were brought together with fluorescent chemical substances under ideal conditions, higher intensities of lighting should result. It remained for Hygrade to combine all these elements in the creation of a simplified, practical lighting unit. To most people, the accomplishment of this task — giving practical application to a natural phenomenon — is little short of miraculous.

NEED IS THE IMPULSE FOR INVENTION

Deficiencies in Other Types of Lamps Led to the Development of FLUORESCENT



“Point Illumination” and Glare: Vast improvements have been made in incandescent lamps since early beginnings. Yet the modern incandescent lamp has certain limitations which required improving if new, higher levels of light were to be gained.

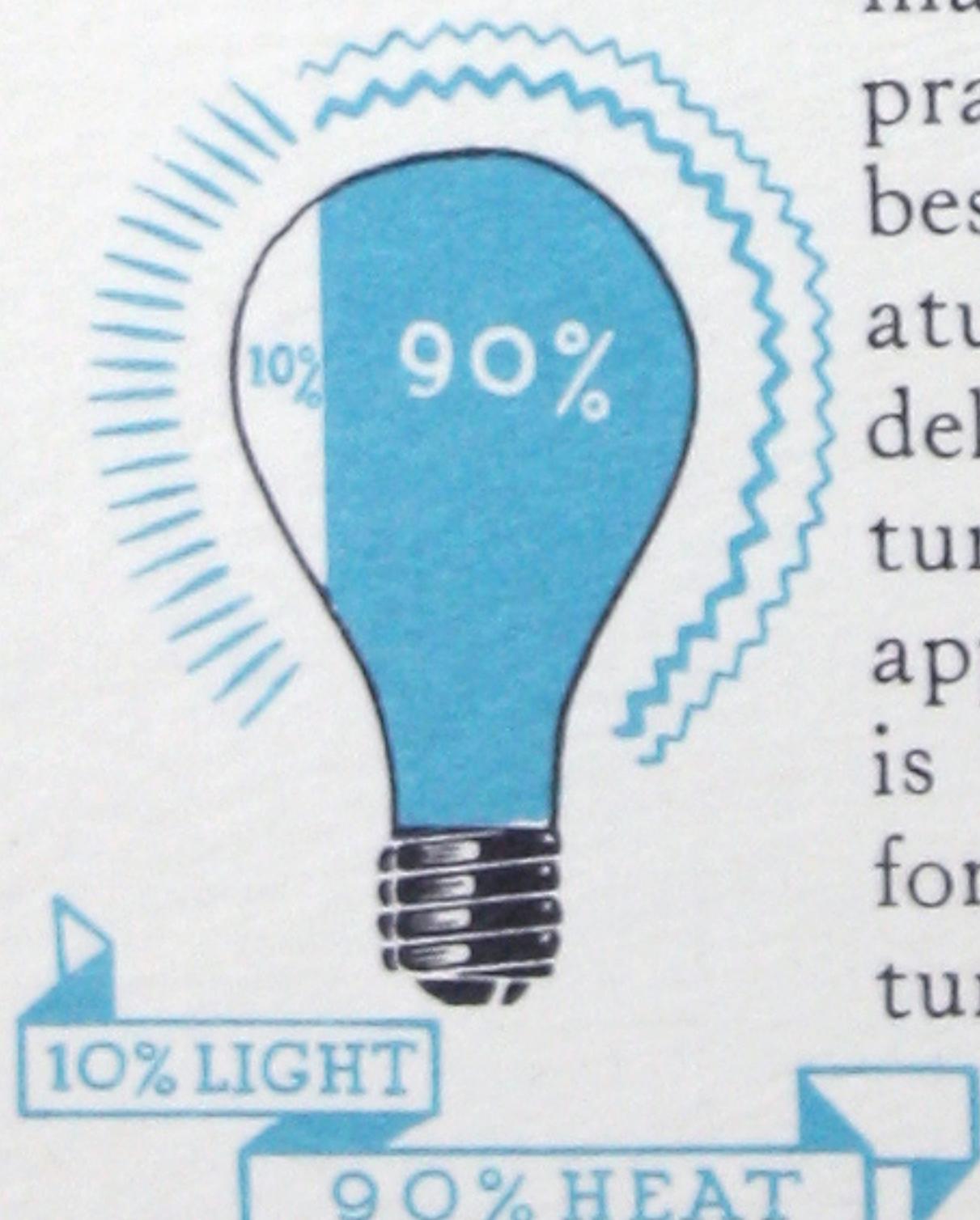
First limitation of the incandescent lamp is that it is a “point” source of light. That is, electric current forced through the inner filament of incandescent lamps brings the filament wire to a point of incandescence. The resulting glow — like that from a white-hot iron multiplied many times — is light. From this single point all light given by the lamp is radiated. Frosting of the glass bulb aids diffusion, but the point of highest intensity is still the filament wire itself. And as brilliance and intensity of light are increased, there is a corresponding increase in glare. Globes, shields, and other devices, while eliminating glare, reduce lighting efficiency as well.

The color of incandescent light was also a fixed factor. To change color of incandescent light required the use of colored filters which cut down the amount of light delivered.

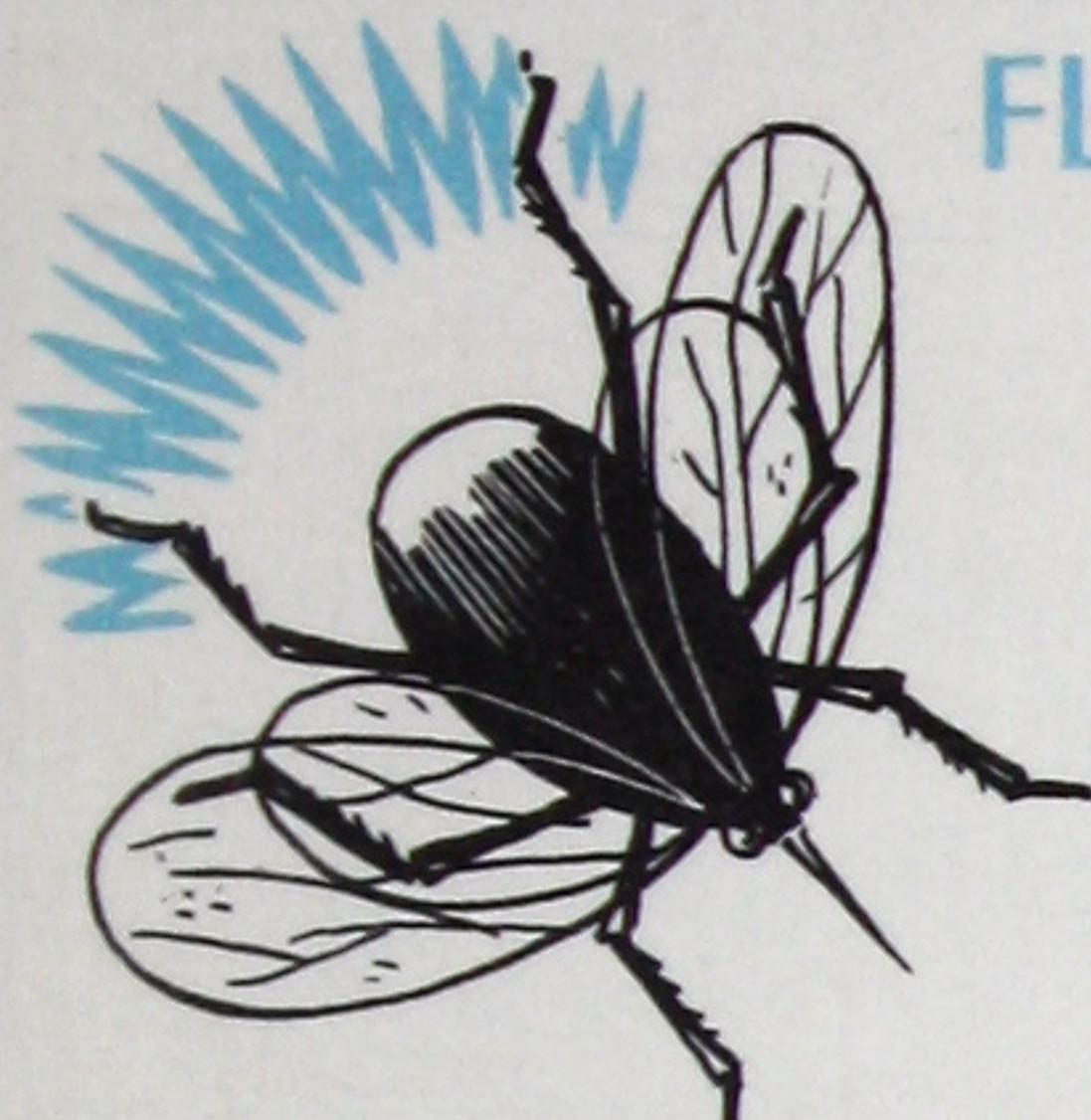
Efficiency Lost to Heat — Limitations on Intensities of Light:

Since incandescent lamps depend upon *generation of heat* in the filament, only 10% of the electrical energy used is converted into light. The rest is lost in heat.

Heat also has a definite bearing on the future development and improvement of incandescent lamps. Various materials have been used as filaments in lamps, with practically universal acceptance of tungsten as the best. While tungsten wire will withstand temperature twice that of molten steel, increase in light delivered depends upon increase in heat. At present, tungsten filaments operate at a temperature of approximately 4800° F. Melting point of tungsten is 6130° F. To *improve* light substantially, therefore, a new light source, without the limitations of tungsten, is needed.



THE APPROACH TO THE DEVELOPMENT OF FLUORESCENT LIGHTING



Fluorescent Phenomena in Nature

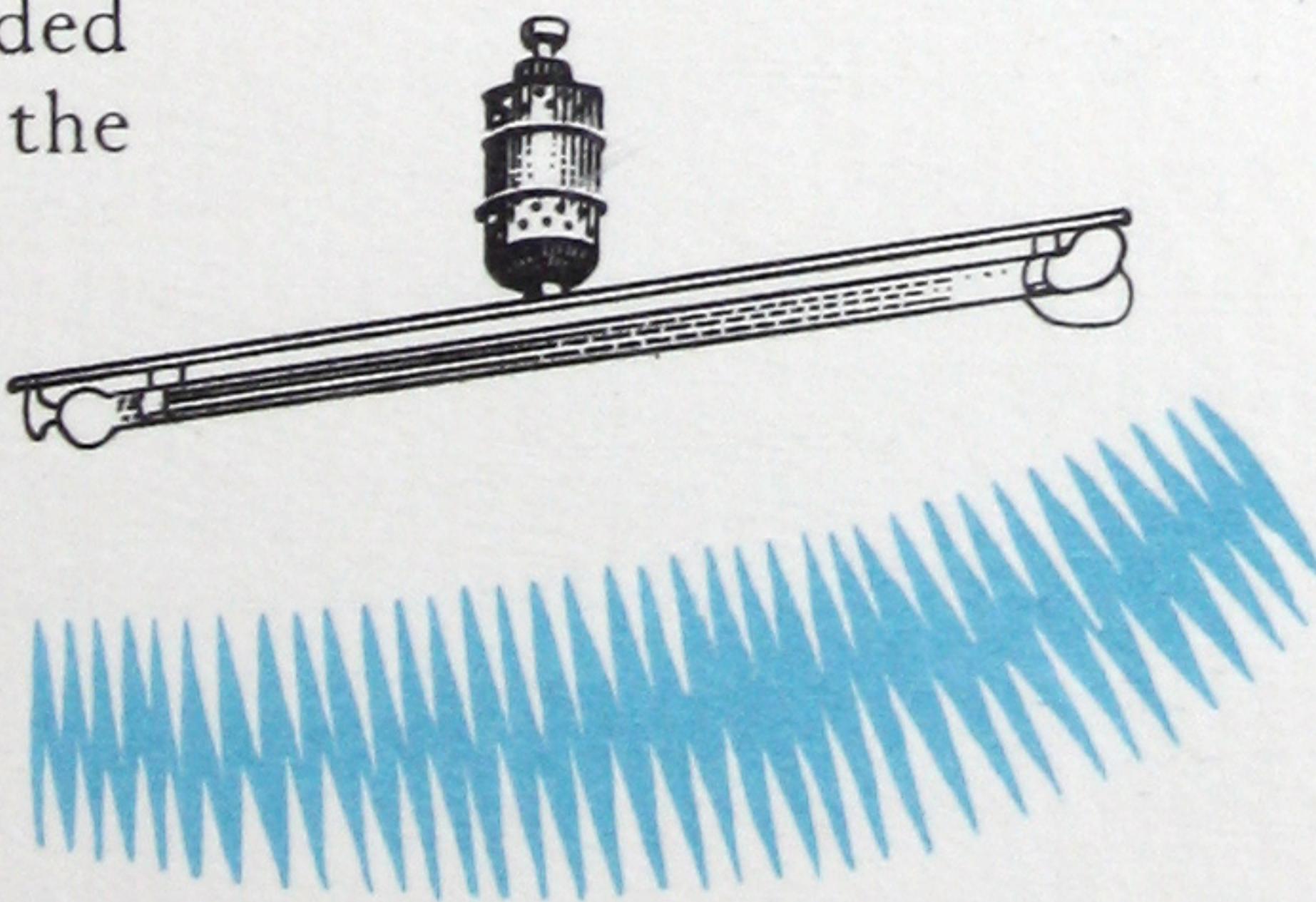
Every one, in childhood, has been introduced to the phenomenon that today — in scientific form — is beginning to contribute so much to our lives. In summer, the thousands of floating lights in the night air — fireflies — are a mysterious example of fluorescence in nature, called phosphorescence. Chemical properties in the body of this tiny insect cause it to glow, with brilliance and depth of color. Many rocks, ores and other substances give out similar radiance when exposed to certain light rays.

Man's First Practical Step Toward Fluorescent Lighting

Initial departure from filament-type lamps took place with the invention of "electric discharge" light sources. In lamps of this type, a flow of negatively charged electrons passes between two separated electrodes. This takes place within a vacuum, or in a gas, enclosed in glass. This gas or vapor becomes "luminescent" through the action or friction between speeding electrons and atoms of the gas. The disturbance set up by this action produces light. Most advanced of this type of light source is the mercury-vapor lamp.

Though this lamp was a step forward, science had still failed to reach its goal in the reproduction of daylight. Light generated by this electric discharge source was an unnatural blue-white, distorting color values, giving a ghastly appearance to persons seen under it. Also, elaborate outside control equipment was required.

Daylight was still the guarded secret of nature, beyond the power of man to reproduce. It still remained for scientists to discover the missing element in discharge lamps that would revolutionize lighting and introduce a new era.



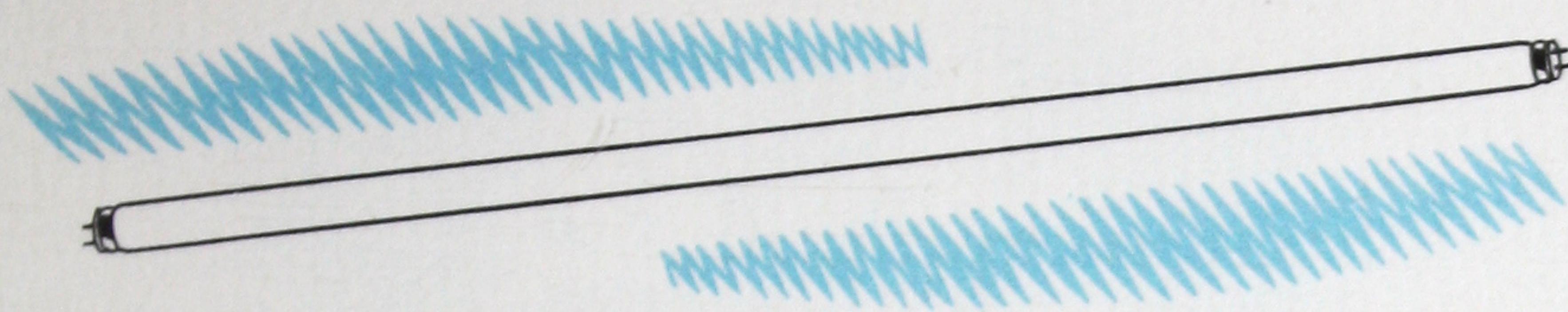
HYGRADE PIONEERS IN MAKING "Light Like the Sun"

It was entirely logical that Hygrade should play a most prominent part in the ultimate perfection of the fluorescent lamp. Hygrade is the *third largest* manufacturer of lamp bulbs — with 39 years' laboratory and manufacturing experience. Also, Hygrade is the *second largest* maker of radio tubes. This was important background for Hygrade's adventure in fluorescent lighting, because radio tubes are, in principle, electric discharge "lamps."



In 1933, while experimenting with an ultraviolet lamp for destroying bacteria, Hygrade became further identified with the development of the fluorescent lamp. This bacteria lamp was of electric discharge type, employing ultraviolet rays. From this — and encouraged by their discoveries — Hygrade engineers began experiments with ultraviolet radiation for lighting purposes.

It was already known that fluorescent substances — or "phosphors" — became luminous when exposed to certain radiation. With these, Hygrade scientists worked endlessly — sought to combine ultraviolet energy, chemical phosphors, and practical lamp making — not only to make a major contribution to lighting science, but to give mankind commercially feasible daylight and a revolutionary new source of light.



FLUORESCENT LIGHTING BECOMES A FACT

Hygrade scientists proceeded on the known basis that fluorescent lamps shed light not through direct visible radiation, but operate rather through the miraculous effect of ultra-violet radiation upon phosphors that line the glass of the cylinder, itself. The *invisible* ultraviolet light is *converted* by the phosphors, and *re-radiated* at longer, visible wave lengths. A magical transformation. And, unlike incandescent "point" light sources, every fraction of an inch on the surface of a fluorescent lamp projects or radiates this light. While the phosphors are thus distributing agents for the light generated by the current and gas source, it is exactly as though each particle of fluorescent substance were an original source of light in itself.

But there were *still* bridges to be crossed before the fluorescent lamp was made really practical.

HYGRADE PUTS A PHENOMENON TO WORK

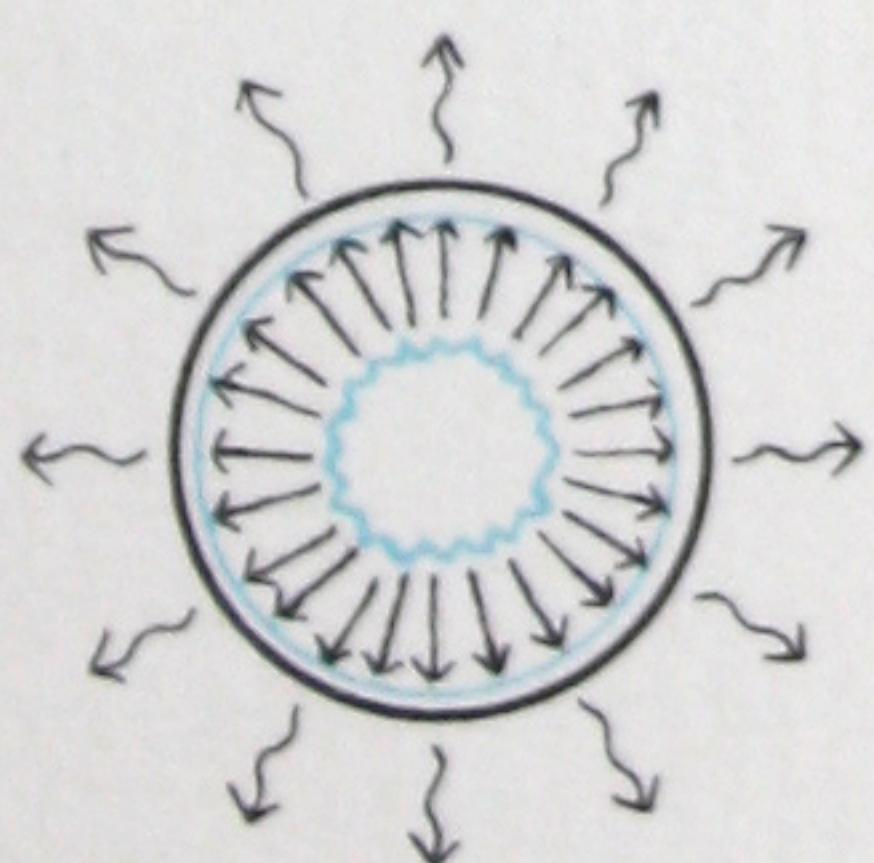
Principal problem at this point was the application of fluorescent substances to the inner surface of the glass cylinder. First methods of application produced a glow; but because phosphor particles were in solid formation, a high percentage of the light did not come through.

First Important Patent in Fluorescent Lighting Field

Major contribution of Hygrade engineers — for which U. S. Patent No. 2096693 was granted — was the development of a viscous medium which allowed the phosphors to adhere to the glass as *separate particles*. Now maximum light came through — glorious, clear, brighter light.

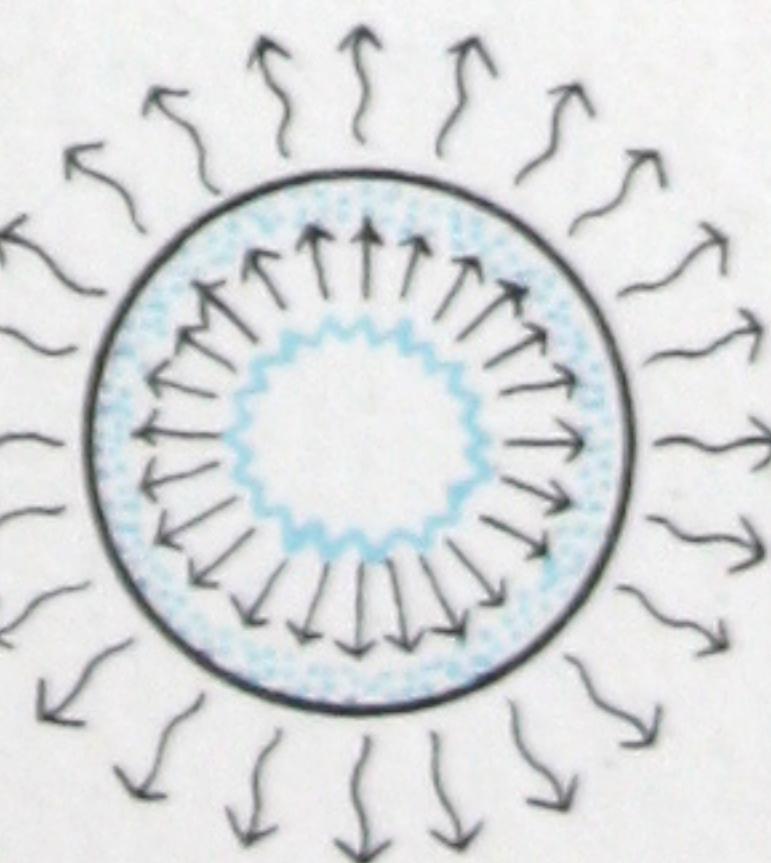
**SOLID
PHOSPHOR
PARTICLES**

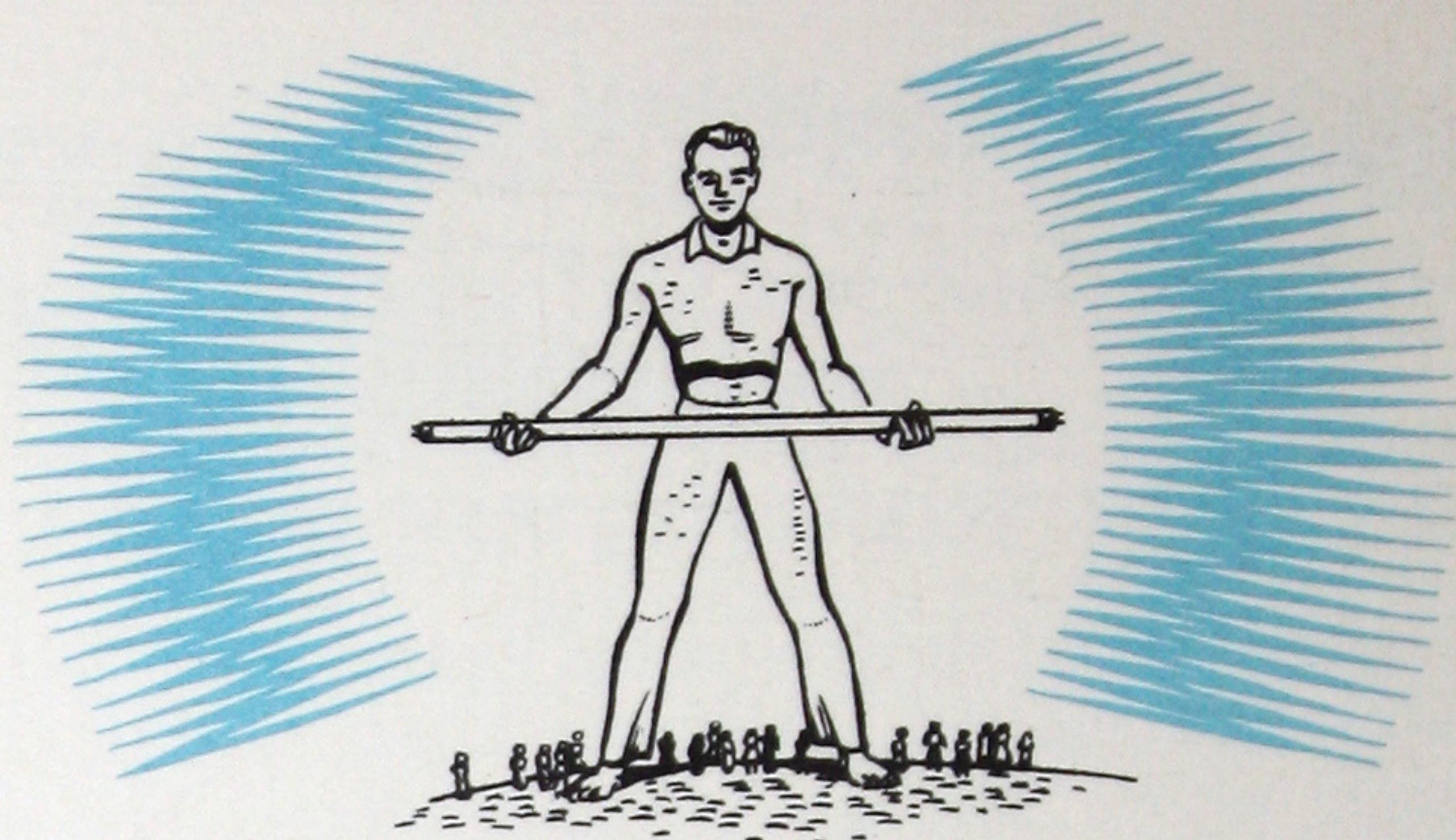
*Only part of light
comes through*



**HYGRADE
SEPARATES
PARTICLES**

*Maximum light
is re-radiated*





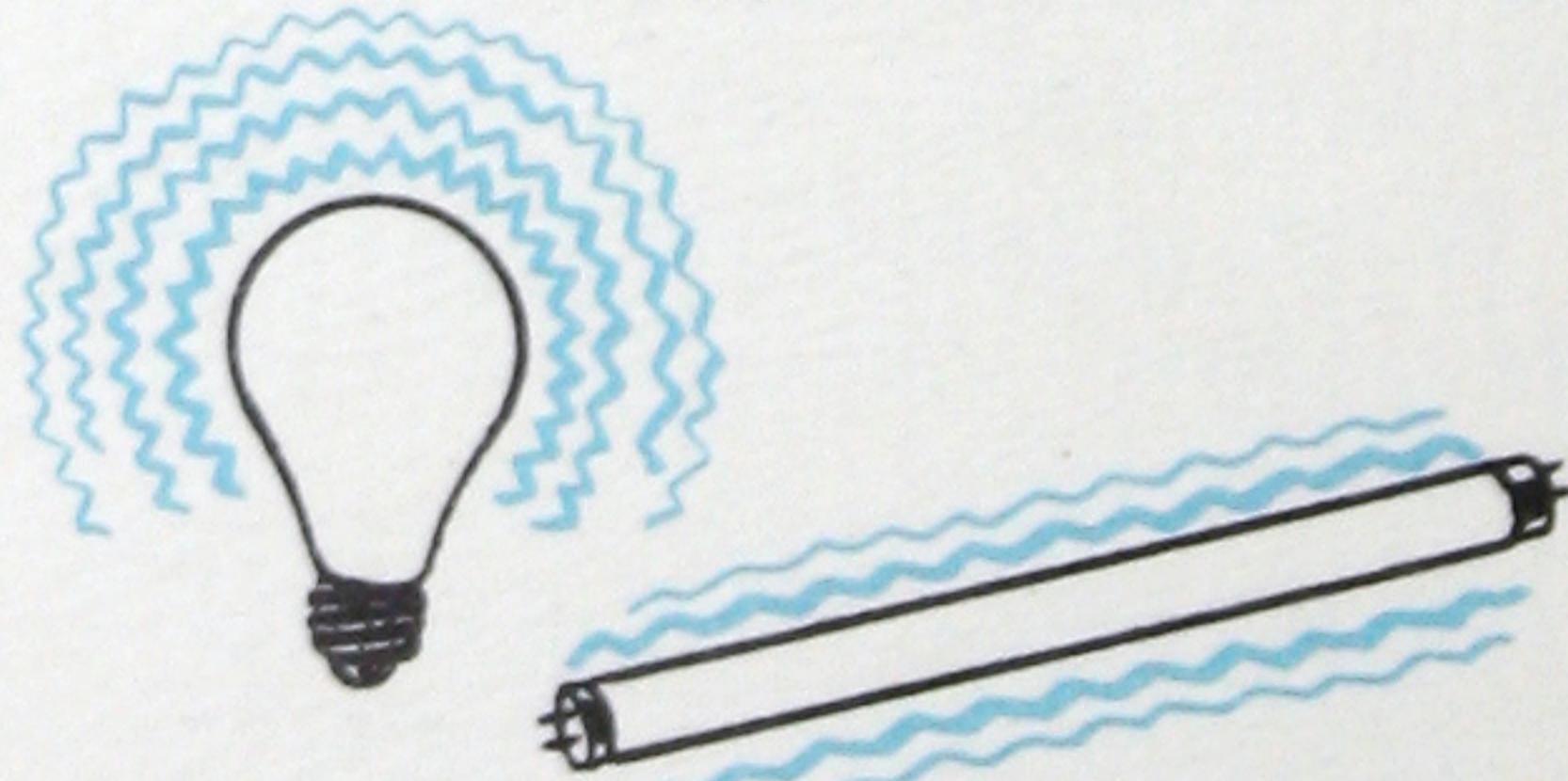
HERE AT LAST WAS LIGHT LIKE THE SUN — Made by Man!

With this great discovery of Hygrade engineers, the dream of scientists from the time of Edison was made a reality. Now the barriers to new high levels of light were overcome.

These glowing cylinders of daylight opened up an entirely new realm in lighting, using existing wiring and established voltages. Here was higher efficiency in light production than ever before known — soft, without glare, perfectly diffused over a *large* lighting area — withal the *coolest* light ever developed. Colors other than daylight would be achieved *efficiently and easily* by proper blending and mixing of different phosphor powders.

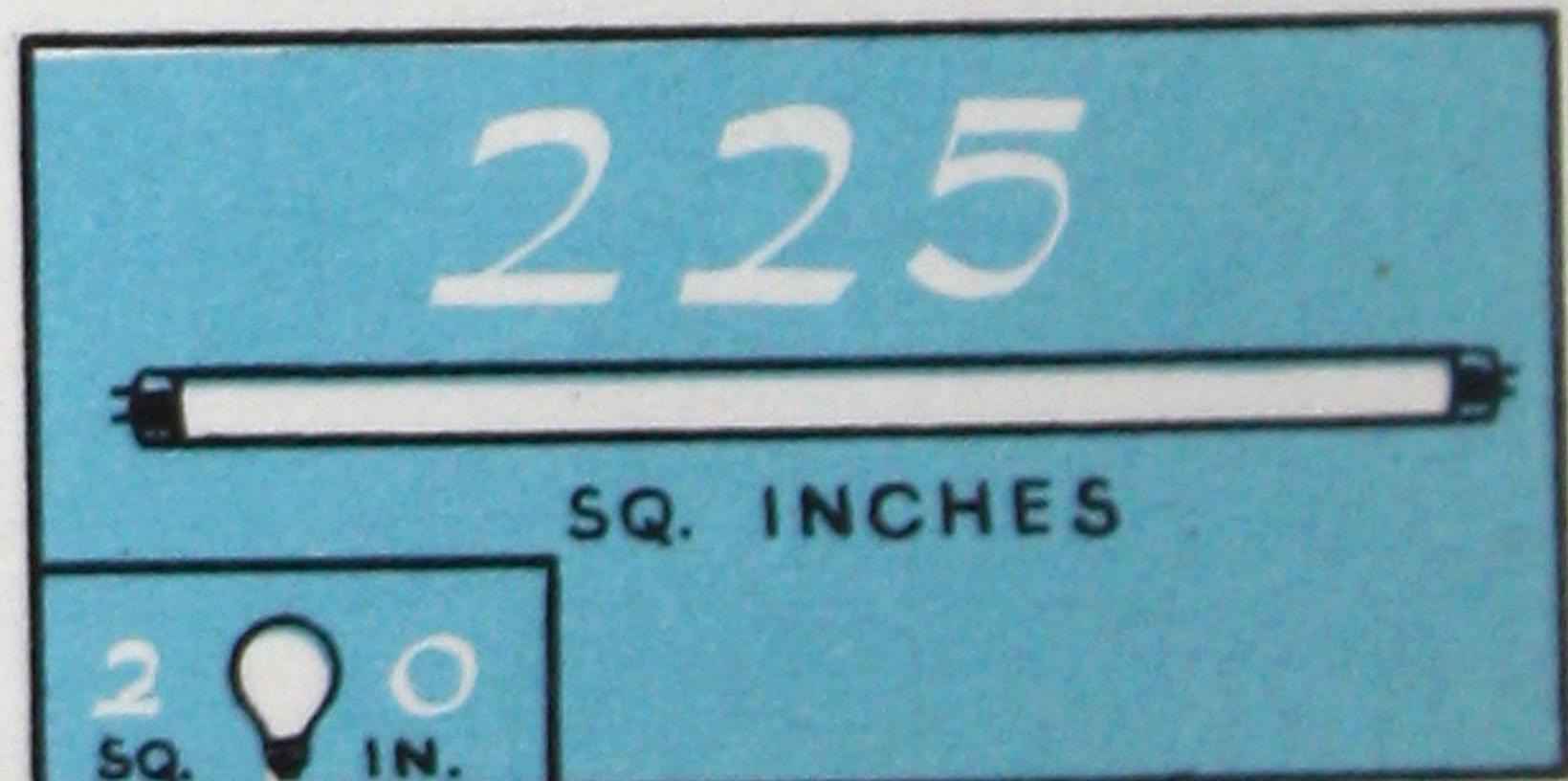
Here was a miraculous new light source, with unlimited possibilities in industrial, decorative and home lighting. *This* was the light man had waited for. At last you could make your own daylight. Now all that remained was to show man how to use it.

HYGRADE FLUORESCENT
50% Cooler



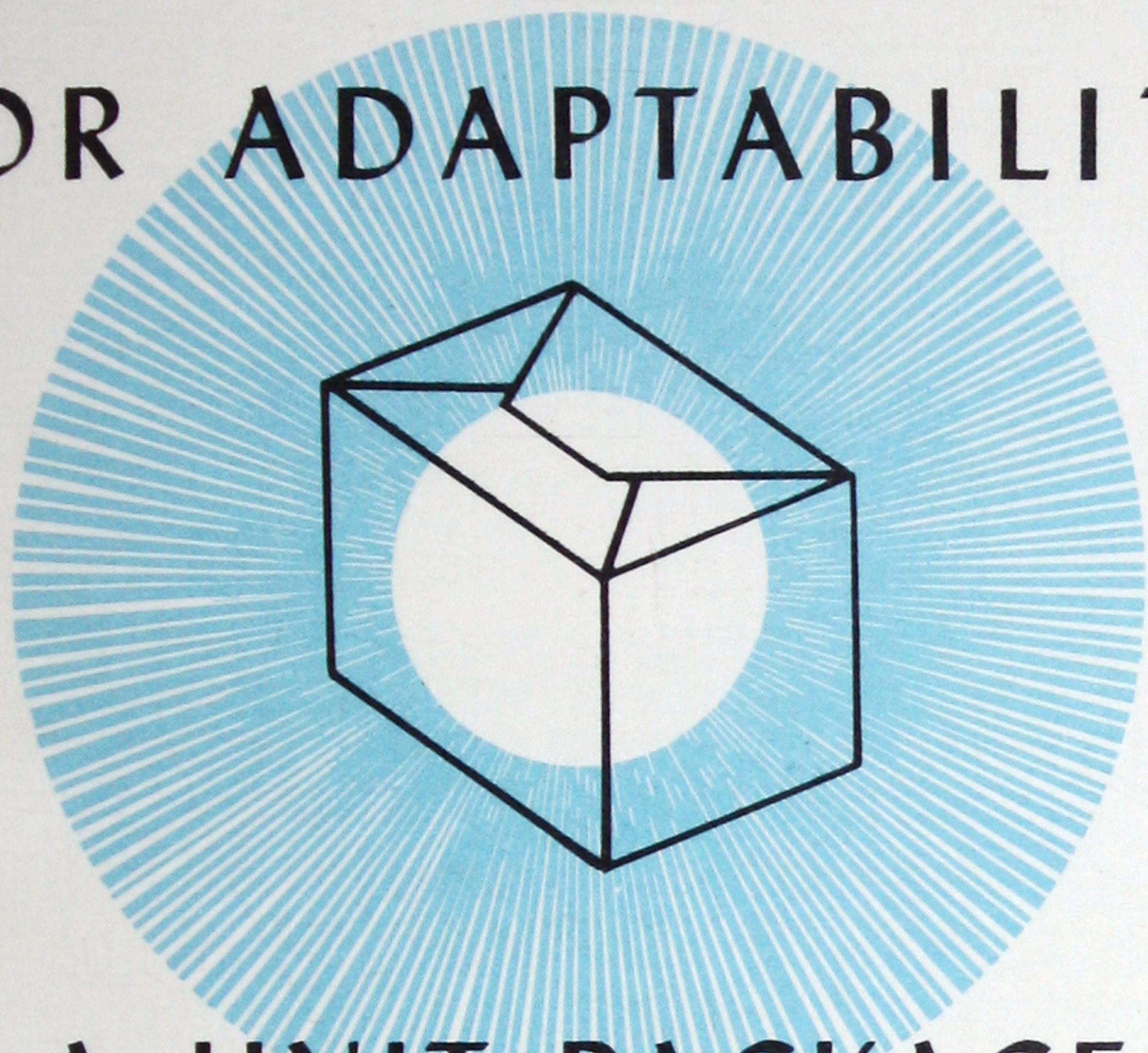
With only one-quarter the radiant heat, and one-half the total heat of other light sources (for the same quantity of light), Hygrade Fluorescent Lamps give the coolest light ever developed.

OVER 11 TIMES
The Luminous Surface



Comparative luminous surface between an ordinary bulb and the new Hygrade Fluorescent Lamp is amazing. The fluorescent has 225 square inches, the incandescent only 20 (40-watt size).

WANTED: FOR ADAPTABILITY



A UNIT PACKAGE OF FLUORESCENT LIGHT

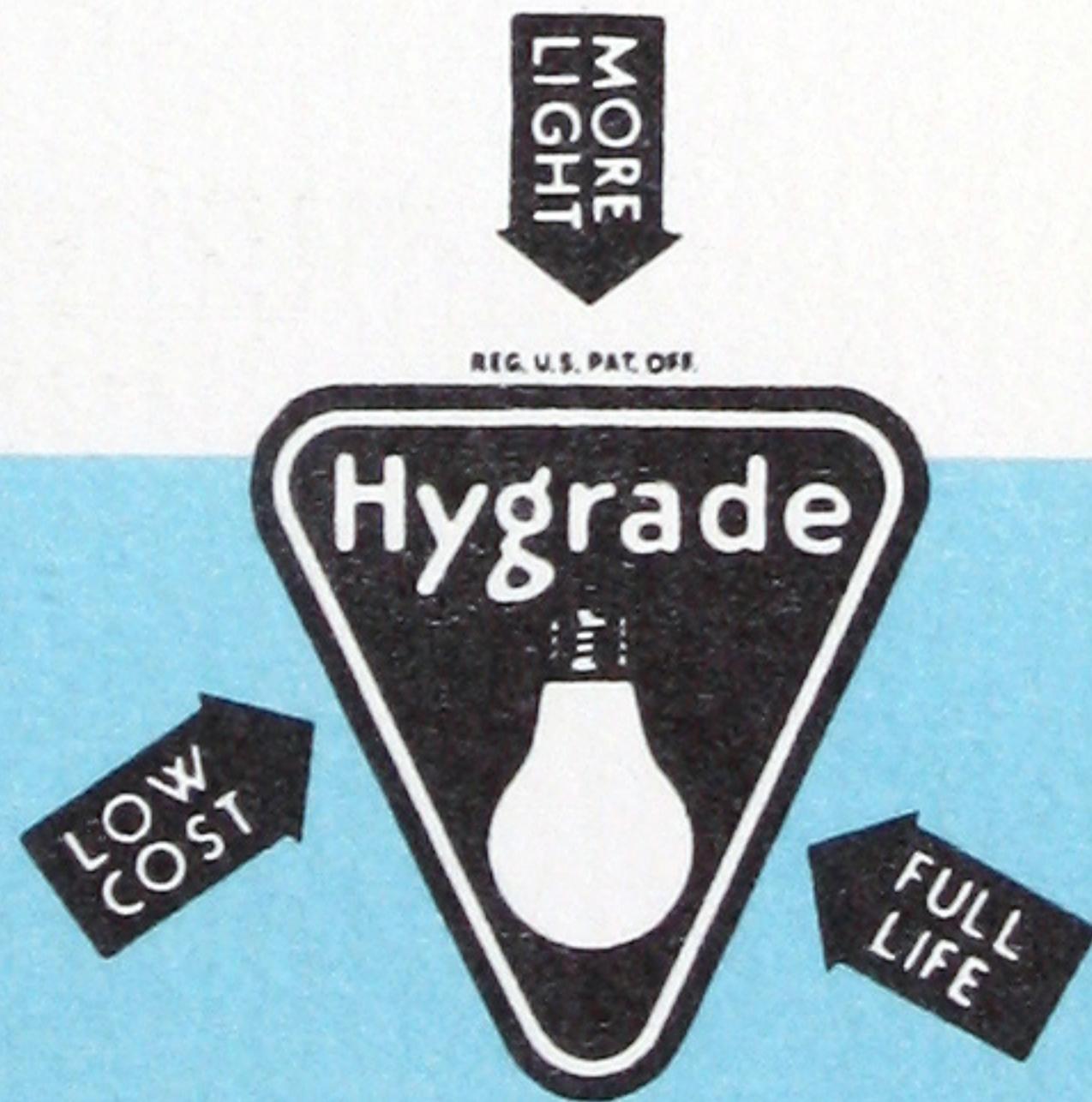
Acceptance of fluorescent lighting was immediate. But just as this was a new type of light, so were its means of adaptation. While existing circuit wiring could be used with fluorescent, this new lighting technique involved purchase and assembly of lamp, fixtures and similar parts, and other steps that sometimes involved considerable installation costs. Further, adaptation of fluorescent at this point required installation of separate and additional auxiliary equipment. Hygrade engineers recognized at once that if fluorescent were to be of maximum industrial and commercial use, the product must be made *readily adaptable*.

A *unit package* for fluorescent lighting — something as simple as plugging in a fan or any common piece of equipment — was needed. Hygrade designers and lighting engineers set to work — developed self-contained “packages” of fluorescent light that are not only easy to install, but especially designed for *maximum delivery* of this new sensational light to business and industry.



HYGRADE
BRINGS MAN-MADE DAYLIGHT
TO BUSINESS AND INDUSTRY
WITH

Fluorescent
MIRALUME

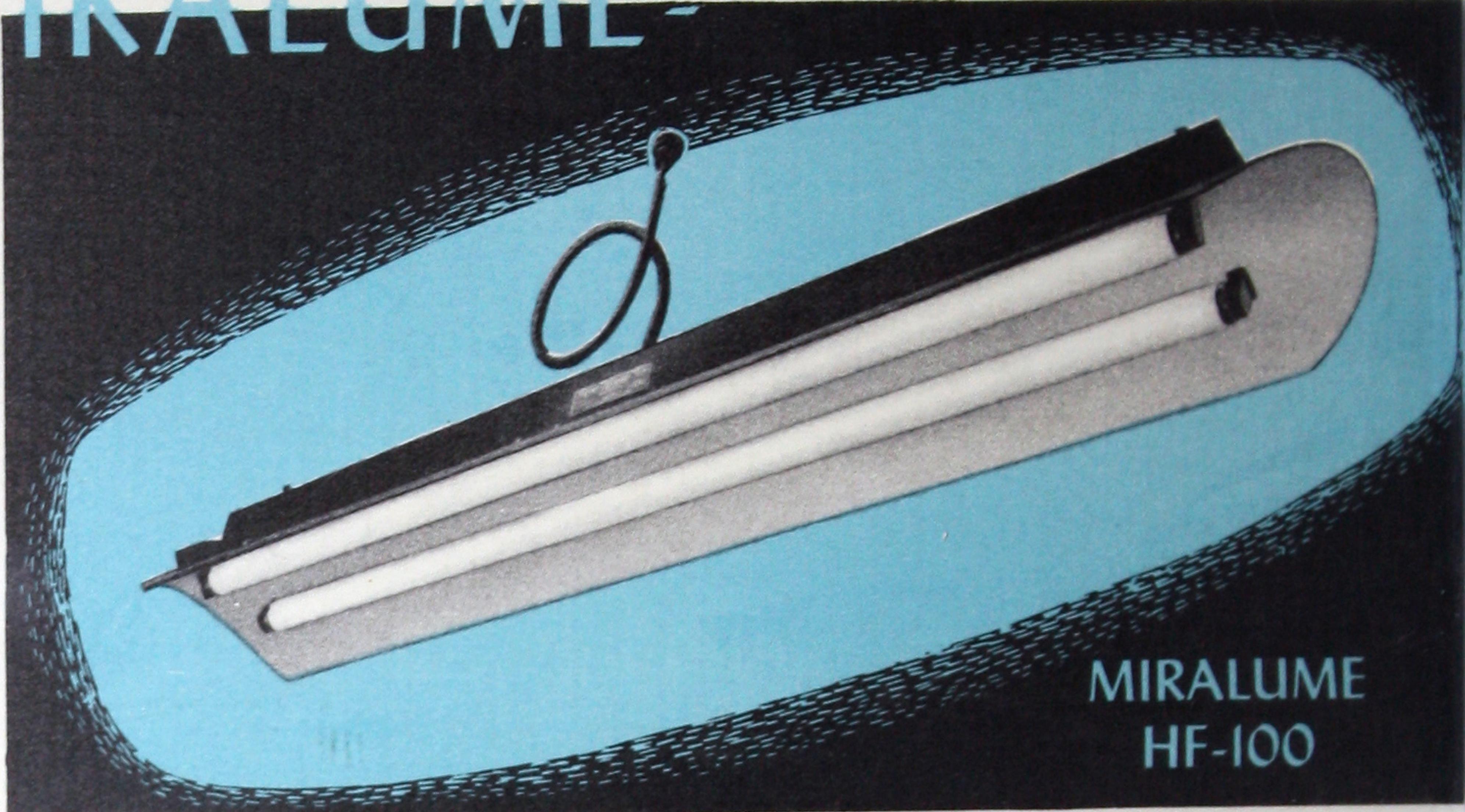


*more than a Fixture
more than a Lamp*

—A PACKAGE OF SUNLIGHT!

MIRALUME-

NEW LIGHTING AND



BUILT TO THE SPECIAL NEEDS OF INDUSTRIAL AND BUSINESS USERS OF LIGHT!

Miralume HF-100 and HF-200 represent the practical adaptation of fluorescent lighting for general use. Each is a complete, self-contained package of sunlight. As shown on the following pages, all need of the separate purchase and assembly of parts, special wiring, high installation expense, and other "extras" is completely eliminated. You simply hang them up — they are all wired and ready to install.

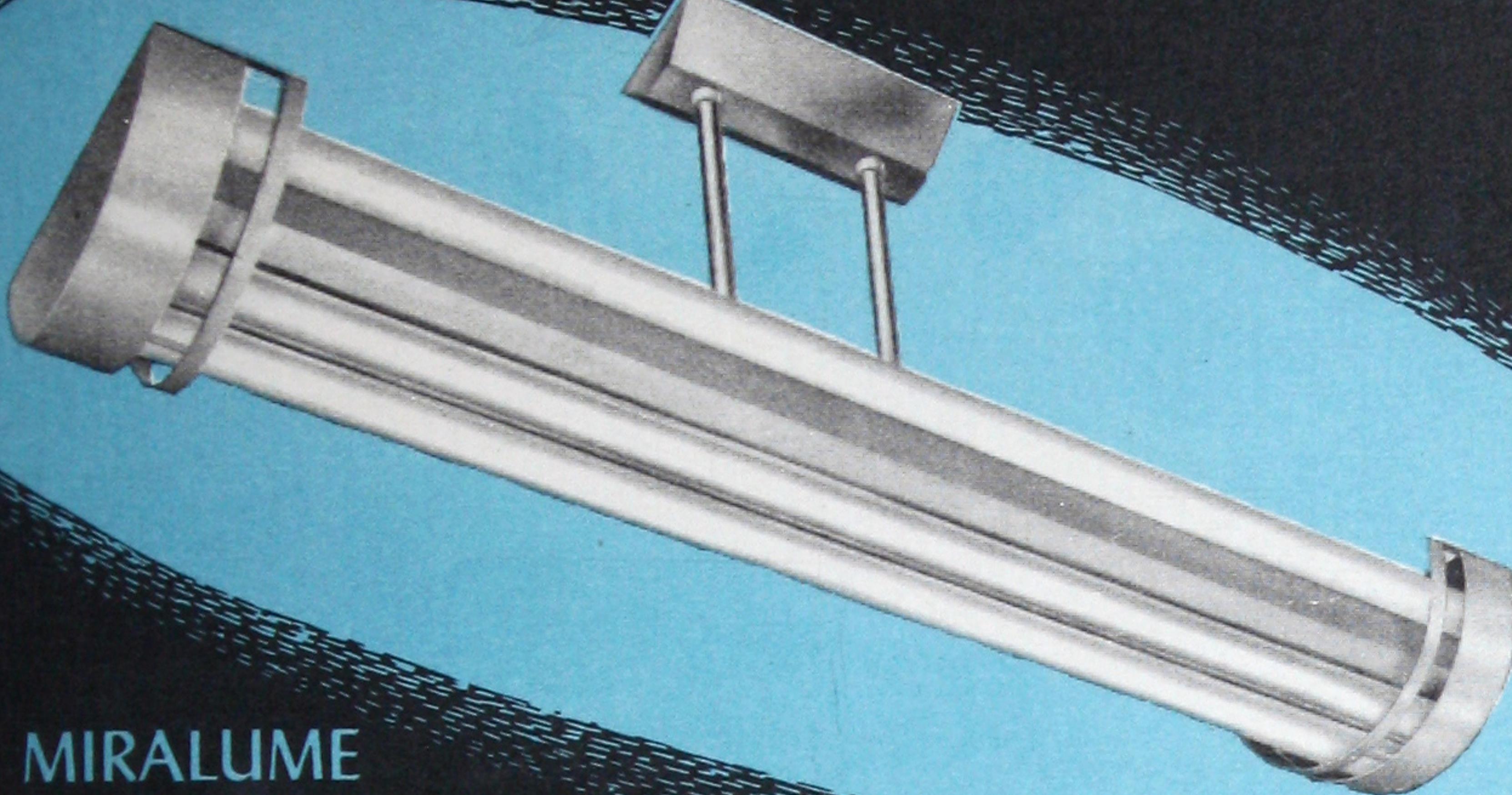
MIRALUME HF-100 Gives Industry Double Benefits

Miralume HF-100 has a large porcelain surface reflector to distribute light over the working area — a practical design especially developed for all industrial uses. Two standard size 40-watt fluorescent lamps supply high levels of light at economical operating cost. Besides supplying superior light during daytime hours, Miralume HF-100 should be useful to industry in overcoming frequent declines in night production volume by bringing illumination up to daytime levels. This is especially important with full operating schedules that now prevail in most industries.

MIRALUME HF-200 for New Effects and Efficiency

Applications of fluorescent lighting in all lines of business are practically unlimited. Miralume HF-200 is designed to

OPERATING EFFICIENCY FOR BUSINESS AND INDUSTRY!



**MIRALUME
HF-200**

answer most needs and applications — in a complete ready-built, ready-to-use package. Miralume HF-200 carries four 40-watt lamps — arranged and streamlined for most effective illumination and attractive appearance. It is available in chassis form, also, upon which special decorative trim or shielding can be added. 70% of the light is directed downward and to the sides, with 30% directed upward for semi-indirect illumination.

Endless uses for Miralume HF-200 exist in Retail Stores, Offices, Hotels, Theatres, Restaurants, Public Buildings, etc. In all applications where air-conditioning exists, the 50% lower heat of fluorescent lamps represents real economy.

Provision for Power Factor Correction and Elimination of Stroboscopic Effect

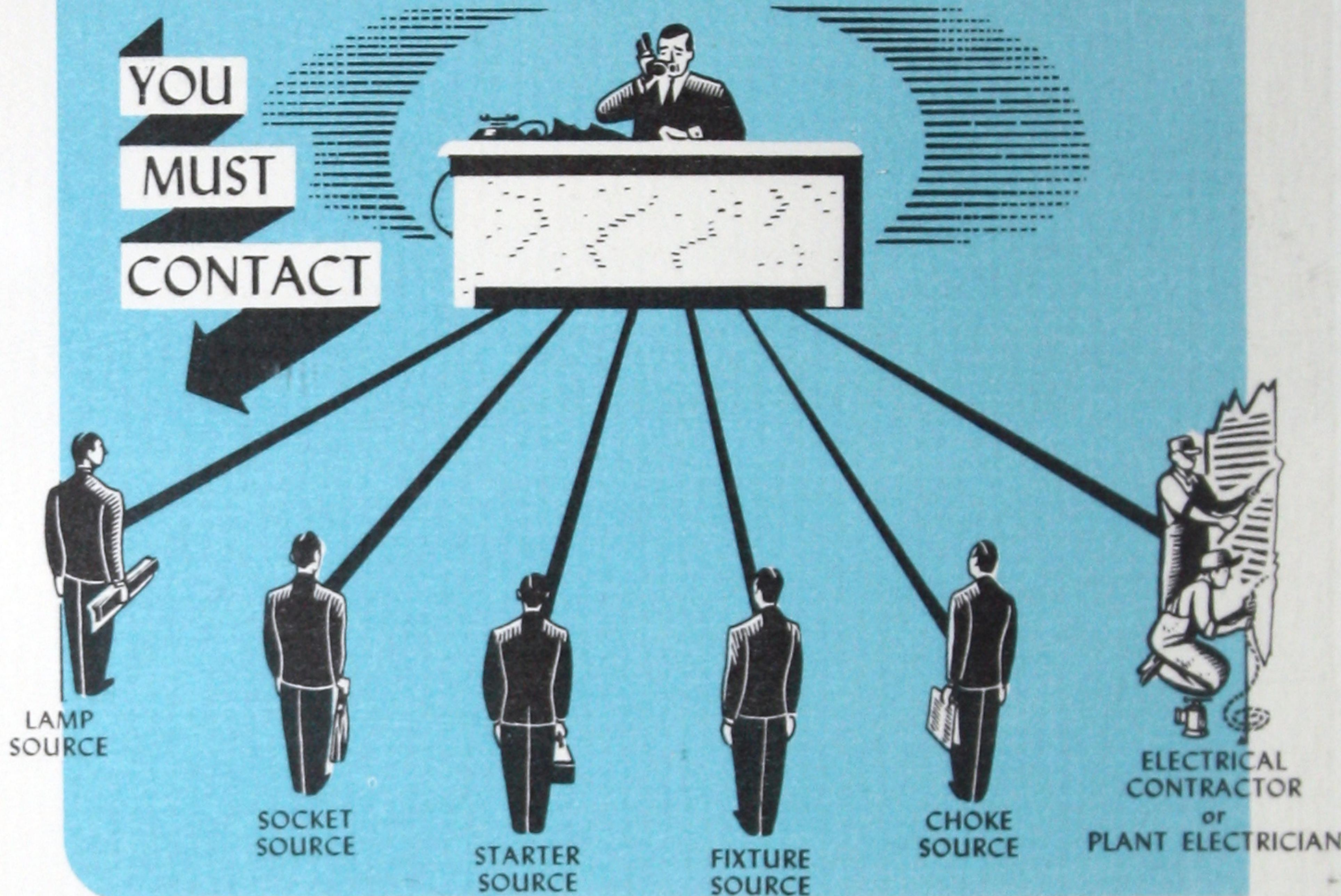
In both Miralume designs, lamps are "out of phase" with each other so that stroboscopic effect is practically eliminated. Built-in capacitor corrects power factor to relieve overloaded lines and to meet requirements of public utilities. Low maintenance cost is assured by the full life of Hygrade Fluorescent Lamps and rugged construction of both Miralume designs.

More Than Fixtures - More Than Lamps PACKAGES OF SUNLIGHT!

MIRALUME HF-100 AND HF-200

Compare These Two Methods of

WITH ORDINARY FLUORESCENT INSTALLATIONS



Assembled under one roof - HYGRADE MIRALUME

Miralume HF-100 and HF-200 are especially designed to make fluorescent lighting easily available to every one! All the planning has been done for you in the scientific Miralume design. Every component and necessary part is made and assembled for you in a *single package* — and all this is done under *one roof* by Hygrade.

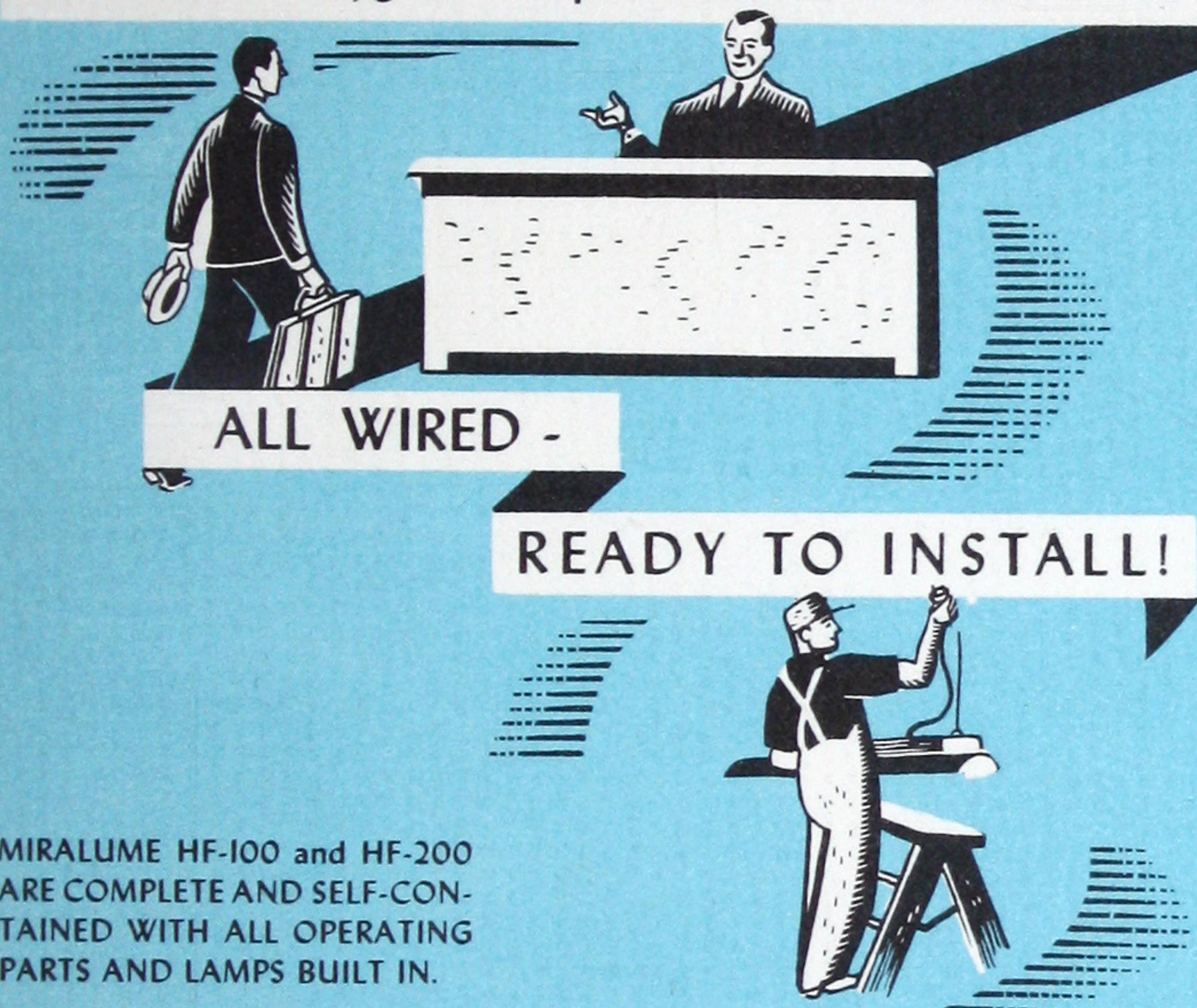
What This Simplicity Means in Testing Fluorescent Lighting

Potential users of fluorescent lighting might hesitate to test it out because of installation steps and cost. Miralume does away with all this. Installation can be accomplished in a very few hours — without rewiring, without committing yourself,

PROVIDE EASY LOW-COST ADAPTABILITY Adopting **Fluorescent** Lighting

INSTALLATION THE MIRALUME WAY!

You Contact Hygrade Representative-ONE TRANSACTION



MIRALUME HF-100 and HF-200
ARE COMPLETE AND SELF-CON-
TAINED WITH ALL OPERATING
PARTS AND LAMPS BUILT IN.

saves planning and detail for you

without time-taking detail and planning. You can completely convert your lighting without the slightest organization upheaval.

Even the most up-to-date incandescent illumination seems old-fashioned when you *see* the results of modern fluorescent lighting. Hygrade's new "packages of sunlight" make the transformation easy and eliminate all cost of experimentation.

One Maker—One Covering Guarantee

Because Miralume HF-100 and HF-200 are completely manufactured and assembled by *one company*, all responsibility for standards of quality is centered in this single firm. This offers definite advantages to the purchaser.

MIRALUME

TYPICAL APPLICATIONS IN BUSINESS & INDUSTRY

Miralume HF-200 — 45 foot-candles — new installation



Miralume HF-100 and HF-200 give top lighting efficiency in applications of all kinds — including stores, offices and public buildings, hospitals, hotels, theaters, restaurants, etc.

Miralume HF-200 — 20 foot-candles. Formerly 10 foot-candles, incandescent lighting

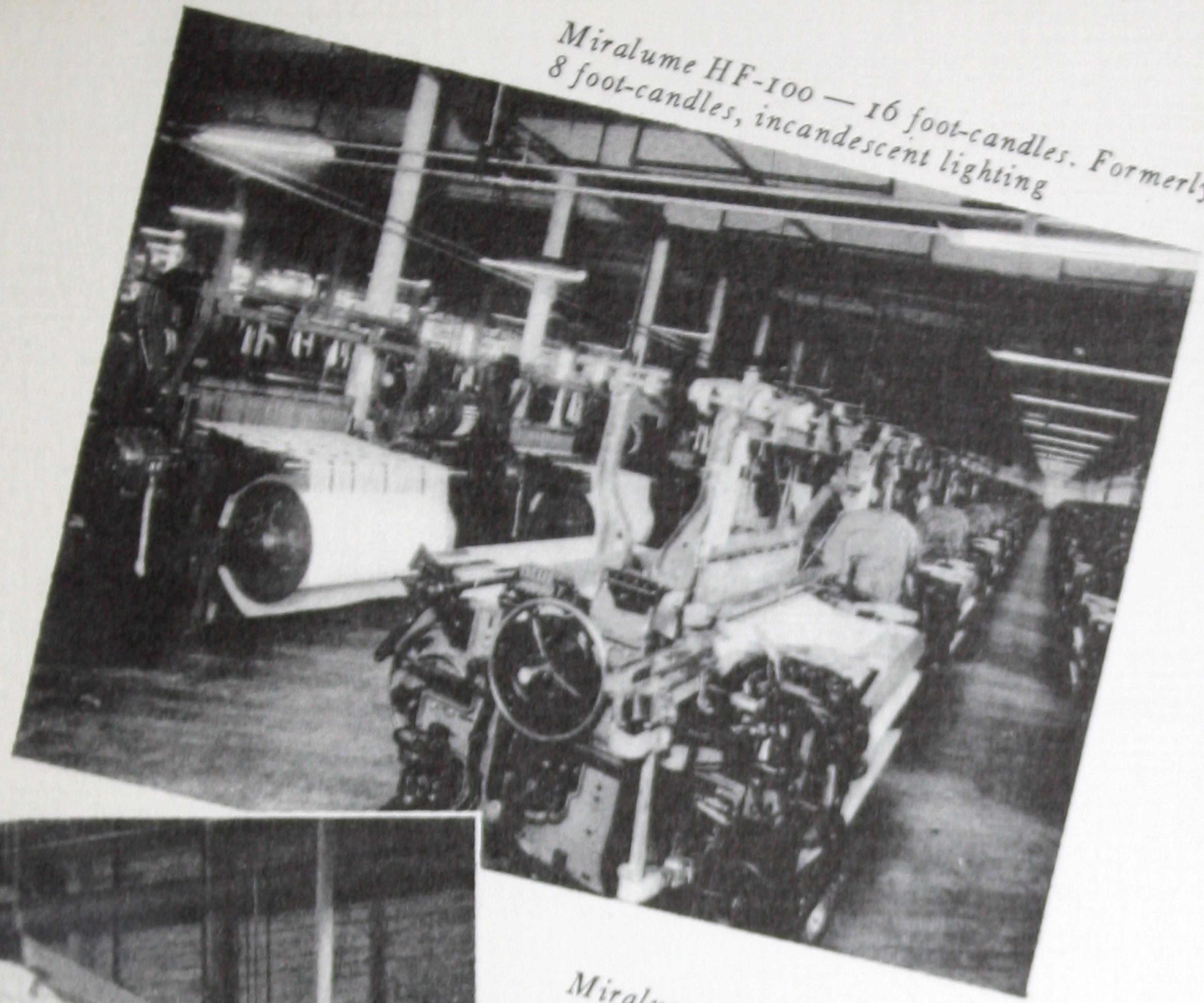


Miralume HF-200 — 25 foot-candles. Formerly 8-10 foot-candles, incandescent lighting



Miralume HF-200 — 35 to 40 foot-candles at desk level — new installation





See back page for Special Descriptive Folders
and Unique Trial Plan

Hygrade Sylvania Corporation
SALEM, MASSACHUSETTS



Unique Trial Plan for Hygrade MIRALUME

Because Miralume is a *package* of light—all ready to install—those interested can try it out first . . . to see if they like fluorescent lighting.

Only a fluorescent *package* like this *can* be tried out. It's not possible to buy parts from different manufacturers, assemble them, then disassemble and return these parts if not satisfied.

MIRALUMES come all wired, and assembled — enable Hygrade to offer generous trial privileges on fluorescent lighting.

Let Us Send You Detailed Information and Specifications on Hygrade Miralume HF-100 and HF-200

The two folders shown at the left fully describe every feature of Miralume HF-100 and HF-200, give complete dimensions, electrical characteristics, spacing specifications, and other information. To obtain these folders, simply address Hygrade Sylvania Corporation, Salem, Mass.



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